



## Analysis of PM<sub>2.5</sub> using the Environmental Benefits Mapping and Analysis Program (BenMAP)

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**Year:** 2007  
**Journal:** Journal of Toxicology and Environmental Health. Part A. 70 (4-Mar): 332-346

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### Abstract:

As epidemiological work from around the world continues to tie PM<sub>2.5</sub> to serious adverse health effects, including premature mortality, the U.S. Environmental Protection Agency (U.S. EPA) has developed a number of policies to reduce air pollution, including PM<sub>2.5</sub>. To assist in the benefit-cost analyses of these air pollution control policies, the U.S. EPA has developed the Environmental Benefits Mapping and Analysis Program (BenMAP). BenMAP is meant to (1) provide a flexible tool for systematically analyzing impacts of changes in environmental quality in a timely fashion, (2) ensure that stakeholders can understand the assumptions underlying the analysis, and (3) adequately address uncertainty and variability. BenMAP uses a "damage-function" approach to estimate the health benefits of a change in air quality. The major components of the damage-function approach are population estimates, population exposure, adverse health effects, and economic costs. To demonstrate BenMAP's ability to analyze PM<sub>2.5</sub> pollution control policy scenarios, we assess two sample applications: (1) benefits of a national-level air quality control program, and (2) benefits of attaining two annual PM<sub>2.5</sub> standards in California (annual average standards of 15 microg/m<sup>3</sup> and 12 microg/m<sup>3</sup>). In the former, we estimate a scenario where control of PM<sub>2.5</sub> emissions results in \$100 billion of benefits annually. In the analysis of alternative standards, we estimate that attaining the more stringent standard (12 microg/m<sup>3</sup>) would result in approximately 2000 fewer premature deaths each year than the 15 microg/m<sup>3</sup> achieves. BenMAP has a number of features to help clarify the analysis process. It allows the user to record in a configuration all of the choices made during an analysis. Configurations are especially useful for recreating already existing policy analyses. Also, BenMAP has a number of reporting options, including a set of mapping tools that allows users to visually inspect their inputs and results.

**Source:** <http://dx.doi.org/10.1080/15287390600884982>

### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution

**Air Pollution:** Particulate Matter

#### Geographic Feature:

resource focuses on specific type of geography

# Climate Change and Human Health Literature Portal

None or Unspecified

## **Geographic Location:** ☒

resource focuses on specific location

United States

## **Health Co-Benefit/Co-Harm (Adaption/Mitigation):** ☒

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

## **Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

## **Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Mitigation

## **Model/Methodology:** ☒

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction, Outcome Change Prediction

## **Resource Type:** ☒

format or standard characteristic of resource

Research Article, Research Article

**Socioeconomic Scenario:** Other Socioeconomic Scenario

**Other Socioeconomic Scenario:** BenMAP

## **Timescale:** ☒

time period studied

Short-Term (